

# BPhil/MRes 2017

## COMPUTING

The Bachelor of Philosophy/Master of Research (BPhil/MRes) combines advanced disciplinary coursework and structured research training, to provide graduates with greater recognition for their academic progress, enhanced employment opportunities and pathways to further study overseas. The two-year full-time BPhil/MRes is the main pathway to a PhD at Macquarie University.

### DEPARTMENT OF COMPUTING

The Department of Computing has a number of active research groups in areas including:

- Sustainable Software and Systems: trust management, social networks, service-oriented computing, cloud computing, Internet of Things, digital health, smart city, big data analytics, data centre management.
- Cybersecurity and Trustworthy Computing: software systems security, large scale data security, mobile and wireless security, Internet of Things security, formal security models and applied cryptography.
- Foundations of Computing: complexity theory, graph theory, number theory and developed algorithms, with direct applications in diverse fields of computing such as mobile networks, cryptography, and secure computing.
- Language Technology and Data Science: manipulation and extraction of information from various kinds of data, including machine learning and data mining over natural language text and speech.
- Software and Systems: formal specification, experimental modelling, quantitative and qualitative methods, with applications ranging from wireless protocols, security systems, service-oriented computing, software tool generation, simulations, games and intelligent virtual agents.
- Virtual Reality and Artificial Intelligence: intelligent agents, human-computer interaction, motion tracking, training simulations, collaborative and immersive environments, design and evaluation of video games.
- Information Systems: models of business processes, risk management, emergency management, climate change.



### PROGRAM STRUCTURE

The MRes program consists of 32 credit points in Year 1 and research experiences (equivalent to 32 credit points) in Year 2. Students have access to a range of units from a variety of subject areas across the University. This allows the construction of a program relevant to your specific interests and skills, subject to academic approval.

Domestic students may study part-time but most international students must study full time.

### YEAR 1

#### Program Structure: Year 1 Units (8 units required)

**MRES700 Research Communications Unit (compulsory)**

**COMP700 Research Frontiers Unit (compulsory)**

**COMP777 Computing Methods for Research (compulsory)**

**Advanced Disciplinary Units (sample: choose 5 units)**

COMP703	Computer Networks
COMP752	Network and Systems Security
COMP771	Information Systems Design and Management
COMP781	Advanced Algorithms
COMP782	Advanced Topics in Theory and Practice of Software
COMP783	Data Science and Machine Learning
STAT723	Statistical Graphics
STAT730	Statistical Methods in Bioinformatics
ENVG708	Geographic Information Science

## Notes on Year 1:

- We run occasional special topics units, depending on student interest. For example, in 2015 this included a unit on Experimental Games Design.
- In addition to the above interdisciplinary units, students have the flexibility to undertake units from across all disciplines, subject to academic approval.
- There is also the possibility to take units from the Master of Information Technology, which has a focus on cybersecurity, networks and management.
- There are some constraints on combinations of units.

## YEAR 2

Year 2 of the MRes will be made up of structured research training where candidates will:

- Extend their knowledge of research innovations in their discipline;
- Survey the current literature related to their particular research interest;
- Study the latest research methods in their field;
- Receive training in project management and plan a major research project; and
- Complete a significant individual research project of their own design, with support of an individual supervisory team.

In addition to the individual supervisory team, there are sessions to support each of the activities.

### Program Structure: Year 2 (Jan-Oct) or (Jul-Apr)

#### Five Core Activities

- 1) Thesis (50 pages) based on a research project
- 2) Research Frontiers 2
- 3) Literature Review
- 4) Research Planning
- 5) Research Methods

**Sample Projects** Project ideas can come from either supervisor or student. A sample of projects from the various research areas of the department that have been completed or proposed by potential supervisors include the following.

#### *Cybersecurity and Trustworthy Computing*

- Security Issues in Cognitive Radio
- Security in Smart Grid Infrastructures
- Analysing information flows in cryptographic APIs
- Combining data mining with security and privacy
- Privacy negotiation between users and service providers

#### *Foundations of Computing*

- Development of Marine Fishing Delay-Tolerant Wireless Wide Area Network
- Using Game Theoretic Approaches to Implement Smart Grids

#### *Language Technology and Data Science*

- Topic Modelling and Syntactic Parsing
- Prediction of Acceptance of Offers for Academic Places Using Data Mining
- Anti-vaccine sentiment analysis for Twitter
- Geo-locating Twitter users without location information using social network structure information
- Natural language data mining of social media

#### *Software and Systems*

- The Functional Web
- Scala-based Dependently-typed Programming Language
- Evaluating Kiama Abstract State Machines for a Java Implementation
- An Exploration of Dependent Typing in Hardware Description Languages

#### *Virtual Reality and Artificial Intelligence*

- Intelligent Agents in a Virtual World: A New Stage for Dance
- Improving Crowd Simulation in Games
- Uncovering missing pieces in history through simulations in virtual worlds
- Empathic agents for health and well-being
- Stereoscopic visualisation and fragment shaders for the correction of optical defects such as astigmatism

#### *Information Systems*

- Overlaying Business Processes with Social Networks
- Business Rules for Humans and Machines

## ELIGIBILITY

An undergraduate or postgraduate degree from a recognised institution and a GPA of at least 2.5 overall (4 point scale), and at least 3.0 at 300-level.

Candidates who have a complete Bachelor Honours degree or relevant Masters by coursework may receive up to 32 credit points towards the program (dependent on content of previous study), making it possible to start the program from Year 2.

## APPLICATION

Applications are submitted online:

<http://www.mq.edu.au/research/phd-and-research-degrees/research-training>

### APPLICATION DEADLINE for 2018 PROGRAM

- ☐ **Domestic: 31<sup>st</sup> October 2017**
- ☐ **International: 31<sup>st</sup> July 2017 (enrolment and MQ/IPRS Scholarship consideration) and 31<sup>st</sup> August 2017 (for enrolment only)**

## STIPENDS AND SCHOLARSHIPS 2018

Information on Domestic and International MRes Scholarships can be found at: <http://www.mq.edu.au/research/phd-and-research-degrees/research-training/research-pathway-scholarships>

## FURTHER INFORMATION

<http://comp.mq.edu.au> > Research > Higher Degree Research > Master of Research

### FIND OUT MORE

**Computing MRes Advisor: A/Prof Mark Dras**  
E: [mark.dras@mq.edu.au](mailto:mark.dras@mq.edu.au)  
Computing General Enquires: [sci.compquery@mq.edu.au](mailto:sci.compquery@mq.edu.au)  
CRICOS Provider 00002J



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